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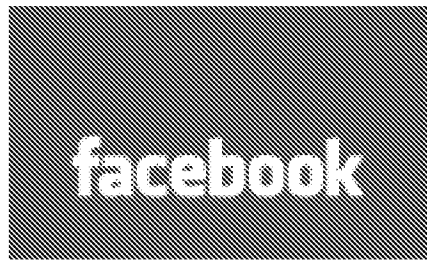
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IBM researching low-power initiatives

EDP Weekly's IT Monitor, August 12, 2002

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Projects To Reduce Cooling And Power Supply Costs And Address Technological And Environmental Concerns

IBM has announced a research program to develop technologies that could help solve continually escalating power consumption issues and help reduce cooling and power supply costs for IT infrastructures. As part of this program, DARPA (the Defense Advanced Research Projects Agency) will support IBM's Center for Low-Power Computing as part of DARPA's Power-Aware Computing and Communications (PACC) program.

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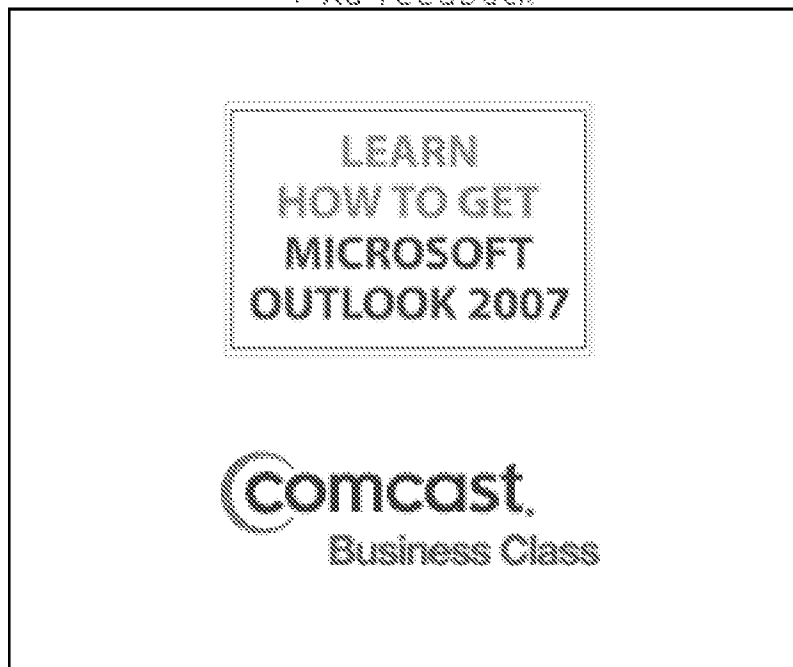
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This effort is part of an industry-government initiative to produce leading technology for energy-efficient systems. As the IT industry expands, the energy used for cooling and power supply has continued to rise, increasing costs for customers while at the same time creating technological, environmental and security problems. According to industry analysts, up to 25 percent of a data center budget can go to the cooling and power supply. Also, a 1994 Department of Energy study estimates that 10 percent of energy consumed in North America is used to support IT systems, which are contributing a major toll to global warming.

Under the agreement with DARPA, IBM will perform research on reliable, power-aware systems, developing new technology for reliable, energy-efficient and high-performing computing platforms. The results of the research will be prototyped in 2003 for some military applications by BAE Systems and used by IBM internally to develop power-efficient products. IBM also will develop design analysis tools to estimate and analyze the power consumption and performance of a PowerPC-based computing system. The tools could be useful for engineers building power-aware systems, as it can reduce the time to solution for producing low-power hardware and software by eliminating the need for expensive and difficult to use lab equipment for supporting the development of low-power systems.

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"Companies need to address power consumption issues early in their product development cycles to

better determine how best to reduce power consumption during those cycles. This program with DARPA builds on the momentum IBM during the past several years has built to address low power across the IT industry," said Dr. David Cohn, director of IBM's Austin Research Lab.

"The Power Aware Computing/Communication (PAC/C) program is developing an integrated software/hardware power management technology suite comprised of novel techniques applied at all levels--from the chip to the full system. This will enable computing systems to reduce energy requirements by ten-fold to a hundred-fold in military applications ranging from hand-held computing devices to unmanned air vehicles." said Robert Graybill, DARPA's PACC program manager.

Recognizing power consumption as a serious issue and low power as a business opportunity, IBM has established a low-power consulting practice that helps customers lower their IT energy usage. IBM Global Services leverage IBM's portfolio of cutting-edge, energy-efficient technology in consolidating complex data center environments for customers.

In October 2001, IBM established a Low Power Center in the IBM Austin Research Lab as part of a company-wide initiative addressing energy consumption of technology. The center, which is part of IBM's Research Lab in Austin, Texas, is focused on all aspects of low-power computing, from device technology to applications, and is the focal point for the DARPA-funded research. The research team at the center has led several efforts, including the design and implementation of the 405LP ultra-low power embedded PowerPC processor, and the prototype of the Super Dense Server, an energy-efficient computing cluster. DARPA has pledged about \$2 million in funding to support IBM's Low Power Center as part of the low-power program.

The mission that DARPA has created for PACC is "JIP: Just In time Power": the right power at the right place at the right time. This mission, which is critically important for military applications and platforms, involves power-efficient systems that would empower military platforms to perform new missions or extend mission timelines. Currently, missile and satellite missions are limited by their constrained power payload. DARPA's program goals targets a power reduction of three orders of magnitude measured by (energy x delay) or (performance/watt). DARPA recognizes that a system-wide approach is needed to realize this goal and create energy-efficient strategies applicable to a wide range of military platforms.

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